

# **EXHIBIT 7**

DICTIONARY  
OF  
**COMPUTER  
SCIENCE,  
ENGINEERING,  
AND TECHNOLOGY**

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## Markov process

**Markov process** a discrete-time random process,  $\{\Psi_k\}$ , that satisfies  $p(\psi_{k+1}|\psi_k, \psi_{k-1}, \dots) = p(\psi_{k+1}|\psi_k)$ . In other words, the future sample  $\psi_{k+1}$  is independent of past samples  $\psi_{k-1}, \psi_{k-2}, \dots$  if the present sample  $\Psi_k = \psi_k$  is known.

**Markov random field** an extension of the definition of Markov processes to two dimensions. Consider any closed contour  $\Gamma$ , and denote by  $\Gamma_i$  and  $\Gamma_o$  the points interior and exterior to  $\Gamma$ , respectively. Then a process  $\psi$  is a Markov random field (MRF) if, conditioned on  $\psi(\Gamma)$ , the sets  $\psi(\Gamma_i)$  and  $\psi(\Gamma_o)$  are independent. That is,

$$\begin{aligned} p(\psi(\Gamma_i), \psi(\Gamma_o) | \psi(\Gamma)) \\ = p(\psi(\Gamma_i) | \psi(\Gamma)) \cdot p(\psi(\Gamma_o) | \psi(\Gamma)) . \end{aligned}$$

*See also* Markov process, conditional statistic.

**markup language** one of any languages for annotation of source code to simply improve the source code's appearance with the means of bold-faced key words, slanted comments, etc. In computerized document preparation, a method of adding information to the text indicating the logical components of a document, or instructions for layout of the text on the page or other information which can be interpreted by some automatic system.

**Marr-Hildreth operator** (1) edge-detection operator, also called Laplacian-of-Gaussian or Gaussian-smoothed-Laplacian, defined by

$$\nabla^2 G = -\frac{1}{\sqrt{2\pi}\sigma^3} \left(1 - \frac{x^2 + y^2}{\sigma^2}\right) e^{-\frac{(x^2+y^2)}{2\sigma^2}} .$$

It generates a smoothed isotropic second derivative. Zero crossings of the output correspond to extrema of first derivative and thus include edge points.

(2) the complete edge detection scheme proposed by Marr and Hildreth, including use of the  $\nabla^2 G$  operator at several scales (i.e., Gaussian variances), and aggregation of their outputs.

**m-ary hypothesis testing** the assessment of the relative likelihoods of  $M$  hypotheses  $H_1, H_2, \dots, H_M$ . Normally we are given prior statistics  $P(H_1), \dots, P(H_M)$  and observations  $y$  whose

dependence  $p(y|H_1), \dots, p(y|H_M)$  on the hypotheses are known. The solution to the hypothesis testing problem depends upon the stipulated criterion; possible criteria include maximizing the posterior probability (MAP) or minimizing the expected "cost" of the decision (a cost  $C_{ij}$  is assigned to the selection of hypothesis  $j$  when  $i$  is true). *See also* binary hypothesis testing, conditional statistic, prior statistics, posterior statistics, maximum *a posteriori* estimator.

**mask** (1) in digital computing, to specify a number of values that allow some entities in a set, and disallow the others in the set, from being active or valid. For example, masking an interrupt.

(2) in image processing, a small set of pixels, such as a  $3 \times 3$  square, that is used to transform an image. Conceptually, the mask is centered above every input pixel, each pixel in the mask is multiplied by the corresponding input pixel under it and the output (transformed) pixel is the sum of these products. If the mask is rotated  $180^\circ$  before the arithmetic is performed, the result is a 2D convolution and the mask represents the impulse response function of a linear, space-invariant system. Also called a kernel. *See also* convolution.

(3) for semiconductor manufacturing, a device used to selectively block photolithographic exposure of sensitized coating used for preventing a subsequent etching process from removing material. A mask is analogous to a negative in conventional photography.

**maskable interrupt** interrupt that can be postponed to permit a higher-priority interrupt by setting mask bits in a control register. *See also* non-maskable interrupt.

**masking** a phenomenon in human vision in which two patterns  $P_1$  and  $P_1 + P_2$  cannot be discriminated even though  $P_2$  is visible when seen alone.  $P_1$  is said to mask  $P_2$ .

**mask programming** programming a semiconductor read-only-memory (ROM) by modifying one or more of the masks used in the semiconductor manufacturing process.

**parity-check code**

be inserted to make this number even. *See also* error detecting code.

**parity-check code** a binary linear block code.

**parity check matrix** a matrix whose rows are orthogonal to the rows in the generator matrix of a linear forward error control block code. A non-zero result of element-wise finite field multiplication of the demodulated word by this matrix indicates the presence of symbol errors in the demodulated word.

It is generated from the parity check polynomial of any linear  $(n, k)$  code and has dimension of  $(n - k \times n)$ . It is used by the decoder for error detection by checking the parity bits.

**parity detection circuit** a parity check logic incorporated within the processor to facilitate the detection of internal parity errors (reading data from caches, internal buffers, external data and address parity errors).

**parking** (1) on a bus, a priority scheme which allows a bus master to gain control of the bus without arbitration.

(2) the process of placing the heads of a disk on the landing zone before shutting off power.

**Parnas partitioning** a software design technique where modules are defined so as to isolate hardware-dependent or volatile sections of code.

**parse** (1) to analyze an input string according to the rules of a grammar.

(2) the results of such an analysis, for example, as represented by a parse tree.

**parser generator** a program that takes a specification of a grammar as input and produces as output a program (or data used by a standard program) which will parse input text. A parser of this type usually takes specific actions during the parse to construct an intermediate representation, and check for errors. Inputs not conforming to the grammar will be rejected.

**parse table** a representation of grammar rules that is processed by an interpreter. Generally constructed by parser generators, provides a general mechanism for constructing parsers for par-

ticular grammars without having to write much of the common code each time.

**parse tree** a graphical representation of the analysis of a sentence of a grammar, in which terminal symbols appear at the leaf nodes and nonterminal symbols appear in the internal nodes. The root node of a parse tree represents the designated root symbol of the grammar.

**parsing** the process by which an input string is analyzed using a grammar to determine if the input string satisfies the rules of the grammar. Also known as syntactic analysis.

**partial borrow** *See* assimilation of borrow.

**partial carry** *See* assimilation of carry.

**partial correctness** during the proving of the program correctness, it indicates that post-conditions follow directly from pre-conditions. *Compare* with total correctness, correctness.

**partial difference** *See* assimilation of borrow.

**partial dividend** at the start of a division, this is the dividend. Subsequently, it is the result of subtracting a multiple of the divisor. At the end it is the (final) remainder.

**partial inheritance** a mechanism by which a class may inherit only partially from the members of its superclass. Typically, this is formalized by specifying in the superclass the private members that are those that cannot be accessed by derived classes. It is the main cause of non-monotonic inheritance.

**partial key** a set of attributes that may be used in conjunction with the key of an identifying owner to uniquely identify instances of a weak entity type.

**partially compatible** two relations are said to be partially compatible if some of their attributes are union compatible.

**partially decidable decision problem** an important class of decision problems that can